**3GPP TSG-RAN WG4 Meeting # 99-e R4-2107918**

**Electronic Meeting, 19th – 27th May, 2021**

**Agenda item:** 6.2.1

**Source:** Moderator (LG Electronics)

**Title:** Email discussion summary for [99e][108] 5G\_V2X\_NRSL\_UE\_RF

**Document for:** Information

# Introduction

In this paper, RAN4 treat the maintenance for UE transmitter/Receiver requirements for single carrier and con-current operation for 5G V2X UE.

The provided technical docs list of email discussion are shown in Reference in the end of the paper.

Candidate target of email discussion for 1st round are listed as following

* 1st round: Treat switching period and position for TDM operation in ITS spectrum and verify the A-MPR requirements for regional regulation with NS\_33 and NS\_52.
  + Topic #1: V2X UE RF requirements
  + Sub-Topic #1-1: Switching position for TDM operation
    - Discussion paper from CATT (9044), vivo(9688), LGE(99189), Xiaomi (10027) and Huawei (11437)
    - CR contents from CATT (9045), vivo(9689), Xiaomi(10020) and Huawei(10438)
  + Sub-Topic #1-2: Update of A-MPR for both NS\_33 and NS\_52
    - Discussion paper from Huawei (10400)
    - CR from Huawei (10427)
* 2nd round: The following issues will further discussed and treat the 6 Todcs to complete RF maintenance issues
  + Issue 1-1-3: RAN4 specification perspective, is it beneficial to specify the On/Off time mask in TS38.101-3 for TDM operation in ITS spectrum?
  + Issue 1-2-1: A-MPR relaxation by emission requirements in NS\_52 for FCC regulation
  + Issue 1-2-3: A-MPR update in NS\_33 (at Fc =5860MHz) for ETSI regulation

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| --- | --- | --- |
| **Tdoc number** | **Title** | **Source** |
| R4-2107745 | WF on A-MPR revision for both NS\_33 and NS\_52. | Huawei |
| R4-2107746 | WF on transient position and related requirements in Rel-16 | LGE |
| R4-2107743  (Rev. of R4-2109045) | CR for TS 38.101-3, Time mask for NR V2X and LTE V2X switching in ITS band | CATT |
| R4-2109922 | CR for TS 38.101-3, Time mask for NR V2X and LTE V2X switching in ITS band | CATT |
| R4-2107744  (Rev. of R4-2110427) | CR for 38.101-1 to correct AMPR value for NR V2X NS\_52(Rel-16) | Huawei |
| R4-2110428 | CR for 38.101-1 to correct AMPR value for NR V2X NS\_52(Rel-17) | Huawei |
| R4-210xxxx | LS on time mask for NR V2X and LTE V2X switching in ITS band | Huawei |

# Topic #1: Maintenance of V2X UE RF requirements

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2109044 | CATT | **Proposal 1: To locate the switching period on the RAT side with lower priority based on the priority indication. If LTE V2X and NR V2X have the same priority, the switching period position can be left to UE implementation.**    Figure 1: Time mask for LTE V2X and NR V2X switching  **Proposal 2: To consider the time mask for LTE V2X and NR V2X switching in Figure 1.** |
| R4-2109045 | CATT | **CR to capture ON/OFF time mask with the Figure 1 for TDM operation in TS38.101-3.** |
| R4-2109688 | vivo | Based on the agreed WF for switching position in last RAN4 #98 meeting, following 6 options are listed   * *Option 1: The whole switching time including transient period should be placed at NR slot.* * *Option 2: The whole switching time including switching period as well as transient periods shall be placed at the previous E-UTRA sub-frame or NR slot* * *Option 3: Determine the switching period location based on priority information* * *Option 4: Decide switching position in RF session to inform to RRM session* * *Option 5: Leave to UE implementation* * *Option 6: Place the switching time including transient periods in one separate slot between LTE subframe and NR slot. The switching period is placed within the separate slot excluding where the transient periods are located.*   **Proposal 1: Option 2 is our first choice. The whole switching time including switching period as well as transient periods shall be placed at the previous E-UTRA sub-frame or NR slot.**  **Proposal 2: Option 3 can be accepted as a secondary choice with RAN1’s impact considered.** |
| R4-2109689 | vivo | **CR to capture ON/OFF time mask with option 2 for TDM operation in TS38.101-3.** |
| R4-2109919 | LGE | Observation 1: The priority based approach to find the switching position is considered as baseline when LTE V2X and NR V2X have different priority.  Observation 2: When LTE V2X and NR V2X have same priority, the switching position is still not decided based on the priority rule.  Observation 3: The combination of Option 3 and 5 will be considered to find the switching position for TDM operation in n47.  Observation 4: The network deployments will not be considered in ITS spectrum and/or the pre-configuration information will be used for TDM operation in n47 or Band 47.  Observation 5: Only V2X UE declaration is needed to apply the interruption test by switching position based on RRM requirements.  **Proposal: Based on observation 1 to 5, the On/Off time mask for TDM operation with switching period need not be specified in TS38.101-3.** |
| R4-2110027 | Xiaomi | Observation 1: RAN1 has clearly defined the NR SL and LTE SL priority.  Observation 2: The value of priority filed for NR SL and LTE SL are directly comparable.  Observation 3: Scheduling restriction has defined an “empty” slot/sub-frame due to the SL switching between NR and LTE, but the location of the “empty” slot/sub-frame is not decided.  Observation 4: The SL switching between NR and LTE should occur in the “empty” slot/sub-frame.  **Proposal 1: To locate the switching period in the lower priority sub-frame or slot.**  **Proposal 2: In case priority information is missing or the priority is the same for both LTE and NR SL, leave up to UE implementation to decide the switching period location.**  Proposal 3: To capture the above statement in TS 38.101-3. |
| R4-2110020 | Xiaomi | **CR to capture ON/OFF time mask with option 3 for TDM operation in TS38.101-3.**  **Figure 6.3E.2-1: Time mask for switching between NR V2X SL and E-UTRA V2X SL, where the switching period is located in NR V2X SL**  Figure 6.3E.2-2: Time mask for switching between E-UTRA V2X SL and NR V2X SL, where the switching period is located in E-UTRA V2X SL |
| R4-2111437 | Huawei | ***Proposal 1: It is proposed to consider the SL switching period position based on priority to align with RAN1 specification***  ***Proposal 2: It is proposed to define the time mask for SL switching as in Figure 1 and clarifies the condition of applicability of the priorities.*** |
| R4-2111438 | Huawei | **CR to capture ON/OFF time mask with option 3 for TDM operation in TS38.101-3.** |
| R4-2110400 | Huawei | Considering the difference of Requirements for ΔfOOB (±0-2 MHz), current A-MPR requirements (13.5dB) for NS\_52 is not enough. At least, 16 dB A-MPR requirements for NS\_52 region 1 is needed.  **Proposal 1: It’s proposed to correct the AMPR requirements as 16dB for NS\_52 region 1 as below.**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Carrier frequency(MHz) | Modulation | A-MPR(dB) | | | |  |  | Region 1 | Region 2 | Region 3 | | 5885 | QPSK | ≤ 16 | ≤ 8.0 | ≤ 5.5 | |  | 16QAM |  | ≤ 8.0 | ≤ 5.5 | |  | 64QAM |  | ≤ 8.5 | ≤ 5.5 | |  | 256QAM |  | ≤ 8.5 | ≤ 6.0 |   Observation 1: The specified emissions limits in FCC regulation are not what RAN4 specified in clause 6.5E.2.3.2 from TS 38.101-1.  Observation 2: Currently, there is no 40MHz ITS spectrum allocation based on FCC regulatory.  **Proposal 2: Companies are encouraged to further check the FCC regulation. It’s up to RAN4 how to address this mismatching issue.**  **Proposal 3: It’s proposed to further update the AMPR requirements for NS\_33 PSSCH/PSCCH (at Fc =5860MHz).**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Carrier frequency [MHz] | Resources Blocks (*L*CRB) | Start Resource  Block | A-MPRBase (dB) | | | |  |  |  | QPSK/16QAM | 64QAM | 256QAM | | 5860 | ≥ 10 and ≤ 15 | 0 | ≤ 24 | | | |  |  | ≥ 1 and ≤ 3 | ≤19 | | | |  | ≥ 10 and ≤ 15 | ≥ 26 and ≤ 38 | ≤6 | | | |  | ≥ 10 and ≤ 15 | ≥ 38 | 7 | | | |  | ≥ 10 and ≤ 20 | ≥ 12 and ≤ 14 | ≤11 | | | |  |  | ≥ 15 and ≤ 19 | ≤9.5 | | | |  |  | ≥ 20 and ≤ 25 | ≤8.0 | | | |  | > 15 and < 25 | ≥ 25 | 8 | | | |  | ≥ 10 and < 40 | ≥ 4 and ≤7 | ≤ 16 | | | |  |  | ≥ 8 and ≤ 11 | ≤ 13.5 | | | |  | ≥ 20 and <40 | ≥ 0 and ≤ 3 | ≤ 22 | | | |  | ≥ 25 and <40 | ≥ 16 and ≤ 21 | ≤ 9.5 | | | |  |  | ≥ 22 and ≤ 27 | ≤ 8.0 | | | |  | ≥ 25 and ≤ 40 | ≥ 12 and ≤ 15 | ≤ 12 | | | |  | ≥ 40 and ≤ 45 | 0 and 1 | ≤ 19 | | | |  |  | ≥ 2 and ≤ 5 | ≤ 16 | | | |  |  | ≥ 6 and ≤ 11 | ≤ 13.5 | | | |  | >45 | ≥ 0 | ≤ 16 | | | | NOTE 1: A-MPRstep =1.2 dB is applied for RBstart 0 and 1 and A-MPRstep =0.7 dB is applied for all other RBstart  NOTE 2: Applicable for Channel Bandwidth = 10 MHz | | | | | | |
| R4-2110427 | Huawei | **CR on correction A-MPR requirements for both NS\_33 and NS\_52 based on R4-2110400.** |

## 1.2 Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

Based on provided contributions, RAN4 mainly treat how to define the switching position and period for TDM operation in ITS spectrum. And verify the A-MPR requirements basd on regional regulatory requirements for both NS\_33 and NS\_42 in 1st round.

* + Sub-Topic #1-1: Switching position for TDM operation
    - Discussion paper from CATT (9044), vivo(9688), LGE(99189), Xiaomi (10027) and Huawei (11437)
    - CR contents from CATT (9045), vivo(9689), Xiaomi(10020) and Huawei(10438)
  + Sub-Topic #1-2: Update of A-MPR for both NS\_33 and NS\_52
    - Discussion paper from Huawei (10400)
    - CR from Huawei (10427)

### 1.2.1 Sub-topic #1-1

*Sub-topic description:* **Switching position for TDM operation in ITS spectrum**

*Open issues and candidate options before e-meeting:*

*There are 6 options for switching position for TDM operation in ITS spectrum based on agreed WF (R4-2016806).*

* *Option 1: The whole switching time including transient period should be placed at NR slot.*
* *Option 2: The whole switching time including switching period as well as transient periods shall be placed at the previous E-UTRA sub-frame or NR slot*
* *Option 3: Determine the switching period location based on priority information*
* *Option 4: Decide switching position in RF session to inform to RRM session*
* *Option 5: Leave to UE implementation*
* *Option 6: Place the switching time including transient periods in one separate slot between LTE subframe and NR slot. The switching period is placed within the separate slot excluding where the transient periods are located.*

*Based on all contributions and reply LS from RAN1 in this meeting, RAN4 can make consensus as follow*

**Agreement: Based on RAN1 reply LS, RAN4 can agree that the switching position will be decided by comparison each LTE SL and NR SL packet priority when the priority is not same in ITS spectrum.**

**Issue 1-1-1: Is it acceptable for the above moderator proposal?**

* Proposals
  + Option 1: Yes.
  + Option 2: No
* Recommended WF
  + Option 1 is agreeable

**Issue 1-1-2: How to apply the switching position when the priority is same or unknown between LTE SL and NR SL in ITS spectrum?**

* Proposals
  + Option 1: Based on RAN1 agreement, it is up to UE implementation. But, it is still open issue how to apply the switching position when they have same priority.
  + Option 2: Regardless of the priority, the whole switching time including switching period as well as transient periods shall be placed at the previous E-UTRA sub-frame or NR slot.
  + Option 3: RAN4 can specify two ON/OFF time mask according to priority rules as shown in Xiaomi’ CR (R4-2110020).
* Recommended WF
  + FFS

**Issue 1-1-3: RAN4 specification perspective, is it beneficial to specify the On/Off time mask in TS38.101-3 for TDM operation in ITS spectrum?**

* Proposals
  + Option 1: In case the priorities of LTE SL and NR SL are the same, this is up to UE implementation for the switching position. So, it is not needed to specify RF requirements. The RRM requirements in clause 12.9.1 in TS38.133 can be considered.
  + Option 2: RAN4 specify the On/Off time mask in TS38.101-3.
* Recommended WF
  + FFS

**Issue 1-1-4: If RAN4 define the on/off time mask for TDM operation in ITS spectrum in TS38.101-3, the transient period should be included in the whole switching time (previous RAN4 agreements) or separate transient period and switching period are shown in the on/off time mask?**

* Proposals
  + Option 1: Based on RAN4 agreements, the whole switching time is considered for on/off time mask.
  + Option 2: RAN4 separately denote with transient period and switching period.
* Recommended WF
  + FFS

### 1.2.2 Sub-topic #1-2

*Sub-topic description:* **Update of****A-MPR requirements for both NS\_33 and NS\_52**

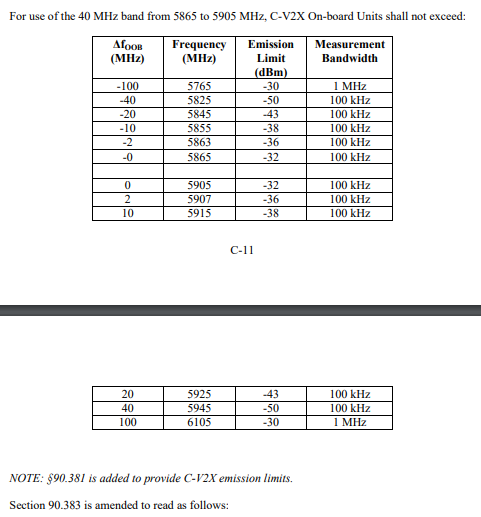
*Open issues and candidate options before e-meeting:*

**Issue 1-2-1: *A-MPR relaxation by emission requirements in NS\_52 for FCC regulation***

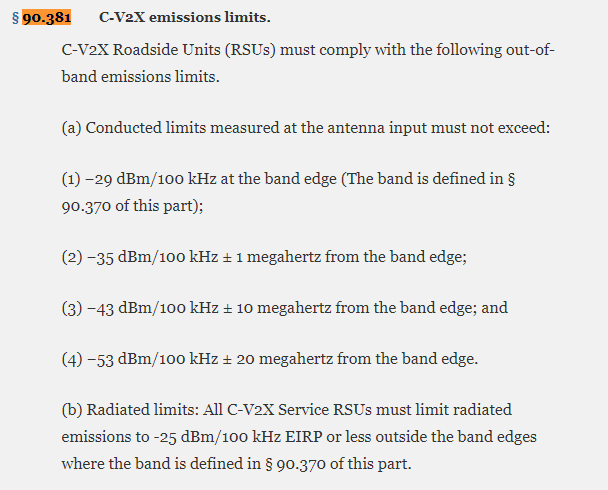
* Proposals
  + Option 1: Allow MPR relaxation based on HW discussion paper (R4-2110400) from 13.5 dB to 16.0 dB in A-MPR region 1.
  + Option 2: Other proposal are not precluded.
* Recommended WF
  + RAN4 will decide one option in 1st round.

**Issue 1-2-2: *Verification of FCC regulation***

In 5G V2X WI in rel-16, RAN4 consider A-SEM requirements based on the FCC regulation in R4-1915430(Qualcomm) which provided the FCC PART §90.381 C-V2X emissions as follow



But, currently, the PART §90.381 C-V2X emissions requirements in FCC URL site in https://www.federalregister.gov/documents/2021/05/03/2021-08801/use-of-the-5850-5925-ghz-band as follow



Based on these information, RAN4 need to study how RAN4 treat the A-MPR requirements for NS\_52 in Rel-16.

* Proposals
  + Option 1: Need further analyze for the status of 90.381 FCC regulation.
  + Option 2: Revise the A-MPR requirement based on current 90.381 FCC regulation.
* Recommended WF
  + RAN4 will decide one option in 1st round.

**Issue 1-2-3: *A-MPR update in NS\_33 (at Fc =5860MHz) for ETSI regulation***

* Proposals
  + Option 1: Allow A-MPR updating based on HW discussion paper (R4-2110400).
  + Option 2: Need further check the detail missing A-MPR requirements.
* Recommended WF
  + RAN4 will decide one option in 1st round.

## 1.3 Companies views’ collection for 1st round

### 1.3.1 Open issues

*One of the two formats, i.e. either example 1 or 2 can be used by moderators.*

Sub topic 1-1: **Switching position for TDM operation in ITS spectrum**

**Issue 1-1-1: Is it acceptable for the above moderator proposal?**

**Agreement: Based on RAN1 reply LS, RAN4 can agree that the switching position will be decided by comparison each LTE SL and NR SL packet priority when the priority is not same in ITS spectrum.**

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| **Company** | **Comments** |
| CATT | Support option 1. |
| LGE | Support option 1. |
| Huawei | Option 1 |
| Xiaomi | Support Option1. |
| Vivo | About the moderator’s proposal, we have two comments:   * The priority rules defined in RAN1 apply to the case simultaneous NR V2X and LTE V2X transmissions, not for the switching case from one transmission to another. * If RAN4 decides to utilize the transmission rules defined in RAN1, we need to further check with RAN1 if RAN4’s decisions override RAN1’s spec.   Since we hold off this issue for a long time, we can accept Option1 for a comprise with RAN1’s impact considered.  LGE comment: Yes, the priority rule is simultaneous transmission between NR V2X and LTE V2X. But majority companies show that their view to decide the switching position for TDM operation. In here, they can follow the other WG’ priority rule. |
| Qualcomm | Support option 1 |

**Issue 1-1-2: How to apply the switching position when the priority is same or unknown between LTE SL and NR SL in ITS spectrum?**

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| --- | --- |
| **Company** | **Comments** |
| CATT | Option 1. |
| LGE | Support option 1 |
| Huawei | Option 1 |
| Xiaomi | I might need to make some clarification here. The two time masks shown in our paper is to show different cases when the switching period is located in LTE or NR, so it might not be a 3rd option here. For us, we also support option 1 as leave for UE implementation. |
| vivo | The same comment as Issue 1-1-1. If we decide the switching period position according to RAN1’s agreement, we need to check with RAN1 first.  LGE comment: Yes, the priority rule is simultaneous transmission between NR V2X and LTE V2X. But majority companies show that their view to decide the switching position for TDM operation. In here, they can follow the other WG’ priority rule. So no need to check the RAN1 view. This issue up to RAN4 decision. |
| Qualcomm | Support option 1 |

**Issue 1-1-3: RAN4 specification perspective, is it beneficial to specify the On/Off time mask in TS38.101-3 for TDM operation in ITS spectrum?**

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| **Company** | **Comments** |
| CATT | Option 2. RAN4 need to specify the time mask based on priority. In case of same priority, it can be left to UE implementation. |
| LGE | Support option1. |
| Huawei | Option 2. Make it clear in the spec the condition of applicability of the priority, and if the priority is unknown, the position of the switching period is up to UE implementation. |
| Xiaomi | We support option 2. As also prepared in our CR, the statement for same priority is added to clarify this specific situation. |
| vivo | Option 2. The same priority case should also be clarified in the spec. |
| Qualcomm | We do not think that a on/off time mask needs to be specified in the RF requirements as what applies in this case is the RRM requirements in TR38.133 section 12.9.1 |
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**Issue 1-1-4: If RAN4 define the on/off time mask for TDM operation in ITS spectrum in TS38.101-3, the transient period should be included in the whole switching time (previous RAN4 agreements) or separate transient period and switching period are shown in the on/off time mask?**

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| **Company** | **Comments** |
| CATT | Option 1 is acceptable to us. The whole switching time can be considered. |
| LGE | Support Option 1 |
| Huawei | Option 1. |
| Xiaomi | From our CR, it is option 2 as to show the transient time and switching time which can give more clues for companies about this requirement. However, the 150us switching time will be captured in the TR is previously agreed and we are stick to this agreement. So in our CR, we have separately denoted transient period and switching period but we don’t have specific numbers for them. Those numbers should be captured in TR. |
| vivo | RAN4 agreed that the exact value for switching period will only be captured in the TR, however not in the spec. Option 1 is preferred. |
| Qualcomm | Support option 1. The whole switching time is considered for on/off time mask |
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Sub topic 1-2: **A-MPR requirements for both NS\_33 and NS\_52**

**Issue 1-2-1: *A-MPR relaxation by emission requirements in NS\_52 for FCC regulation***

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| **Company** | **Comments** |
| LGE | When we consider same A-SE requirements in TS38.101-1 with NS\_52, LGE prefer to keep the current A-MPR requirements. The 16.5 dB A-MPR is quite larger value from our simulation results. 15dB is can acceptable to us. |
| Huawei | Option 1: Allow MPR relaxation from 13.5 dB to 16.0 dB in A-MPR region 1. |
| Qualcomm | 16 dB is very high based upon our work. 15 dB would be acceptable to us |

**Issue 1-2-2: *Verification of FCC regulation***

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| **Company** | **Comments** |
| LGE | Prefer Option 1. We would like to hear the Qualcomm view on it. They provided the FCC regulation in R4-1915430. So need to consider the status of 90.381 FCC regulation for C-V2X emission limits. |
| Huawei | Should we consider the part §95.3179 for C-V2X on Board Units instead of RSC? It seems that we have to revise the A-MPR requirements for NS\_52 based on the latest FCC regulatory. |
| Qualcomm | Option 1: Need further analyze for the status of 90.381 FCC regulation. |

**Issue 1-2-3: *A-MPR update in NS\_33 (at Fc =5860MHz) for ETSI regulation***

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| **Company** | **Comments** |
| LGE | We can acceptable to change from Huawei (R4-2110400). |
| Huawei | Option 1. |
| Qualcomm | Option2: Need further check the detail missing A-MPR requirements. |

### 1.3.2 CRs/TPs comments collection

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

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| **CR/TP number** | **Comments collection** |
| **R4-2109045** | LGE: RAN4 can further discussion based on the sub-topic 2-1 decision. |
| Qualcomm : Cannot agree to this CR. According to WF 2016806 ‘SL switching period’ the switching time is captured in TR only. As per that agreement Figure 6.3E.2-1 should not illustrate the transient periods. The transient periods should be contained within the ‘switching period’ in this diagram. |
| Company C |
| **R4-2109689** | LGE: RAN4 can further discussion based on the sub-topic 2-1 decision. |
| Company B |
| Company C |
| **R4-2110020** | LGE: RAN4 can further discussion based on the sub-topic 2-1 decision. The detail time information is not need to captured in the ON/OFF time mask based on RAN4 agreements with whole switching time is considered in WF (R4-2016806). |
| Qualcomm : Cannot agree to this CR. According to WF 2016806 ‘SL switching period’ the switching time is captured in TR only. As per that agreement figures 6.3E.2-1 and 6.3E.2-2 should not illustrate the transient periods. The transient periods should be contained within the ‘switching period’ in these diagrams. |
| Company C |
| **R4-2111438** | LGE: RAN4 can further discussion based on the sub-topic 2-1 decision. |
| Company B |
| Company C |
| **R4-2110427** | LGE: For A-MPR for FCC regulation(NS\_52),RAN4 need to clarify the detail reason for the existing emission requirements. For A-MPR for ETSI regulation (NS\_33), we can accept the revised A-MPR table. |
| Qualcomm Need to further study the NS\_33 A-MPR modifications being proposed and the FCC regulations as it pertains to NS\_52 |
| Company C |

## 1.4 Summary for 1st round

### 1.4.1 Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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|  | **Status summary** |
| **Sub-topic#1-1:**  **Switching position for TDM operation in ITS spectrum** | **Issue 1-1-1: Is it acceptable for the above moderator proposal?**  **All interested companies support the follow agreements in 1st round**  *Agreements:*  **Based on RAN1 reply LS, RAN4 can agree that the switching position will be decided by comparison each LTE SL and NR SL packet priority when the priority is not same in ITS spectrum.**  *Recommendations for 2nd round:*  **Based on the above agreements, RAN4 further discuss the following issue 1-1-3 in 2nd round.** |
| **Issue 1-1-2: How to apply the switching position when the priority is same or unknown between LTE SL and NR SL in ITS spectrum?**  **Almost companies support option 1, and one company propose to check the RAN1 view for TDM operation.**  *Agreements:*   * Option 1: Based on RAN1 agreement, it is up to UE implementation. But, it is still open issue how to apply the switching position when they have same priority.   *Recommendations for 2nd round:*  **RAN4 need further discuss how to decide the****switching position in issue 1-1-3 when the priority is same or unknown between LTE SL and NR SL in ITS spectrum.** |
| **Issue 1-1-3: RAN4 specification perspective, is it beneficial to specify the On/Off time mask in TS38.101-3 for TDM operation in ITS spectrum?**  **In 1st round, 4 companies proposed to specify the On/Off time mask in TS38.101-3, and 2 companies proposed to consider RRM requirements for TDM operation.**  **Hence, two option still further discussed in 2nd round as follow**  *Candidate options:*   * Option 1: In case the priorities of LTE SL and NR SL are the same, this is up to UE implementation for the switching position. So, it is not needed to specify RF requirements. The RRM requirements in clause 12.9.1 in TS38.133 can be considered. * Option 2: RAN4 specify the On/Off time mask in TS38.101-3.   *Recommendations for 2nd round:*  **Based on above 2 candidate options, RAN4 will further discuss whether specify the On/off time mask or not in 2nd round.** |
| **Issue 1-1-4: If RAN4 define the on/off time mask for TDM operation in ITS spectrum in TS38.101-3, the transient period should be included in the whole switching time (previous RAN4 agreements) or separate transient period and switching period are shown in the on/off time mask?**  **In 1st round, all companies support option 1 as follow. So, if RAN4 agree to specify the On/Off time mask in issue 1-1-3, then the whole switching time is considered.**  *Agreements:*   * Option 1: Based on RAN4 agreements, the whole switching time is considered for on/off time mask.   *Recommendations for 2nd round:*  **Based on the decision of issue 1-1-3, RAN4 consider above agreement to specify the On/off time mask in TS38.101-3.** |
| **Sub-Topic#1-2:**  **A-MPR requirements for both NS\_33 and NS\_52** | **Issue 1-2-1: *A-MPR relaxation by emission requirements in NS\_52 for FCC regulation***  ***In 1st round, the MPR relaxation was discussed, two companies can accept the 15dB MPR relaxation. But 16dB MPR is not acceptable. So, As moderator, following candidate options are proposed in 2nd round.***  *Candidate options:*   * Option 1: Allow 16.0 dB MPR from 13.5dB based on HW discussion paper (R4-2110400 in A-MPR region 1. * Option 2: Allow 15.0 dB MPR from 13.5dB based on 1st round discussion in A-MPR region 1.   *Recommendations for 2nd round:*  **Based on above 2 candidate options, RAN4 will further discuss the A-MPR relaxation in 2nd round.** |
| **Issue 1-2-2: *Verification of FCC regulation***  ***In 1st round, two companies prefer further discussion on the 90.381 FCC regulation for C-V2X emission limits. And one company propose update A-MPR requirements based on the latest FCC regulation. So RAN4 still need further discussion with following Tentative agreements in next RAN4 meeting.***  *Tentative agreements:*   * Need further analyze for the status of 90.381 FCC regulation until Aug. RAN4 meeting. * If the proposed emission requirements from R4-1915430(Qualcomm) is not clear until # RAN 100-e meeting, then the A-MPR requirement will revise to consider the latest 90.381 FCC regulation.   *Recommendations for 2nd round:*  **Based on the tentative agreement, RAN4 will further discuss the FCC regulation issues in next RAN4 meeting.** |
| **Issue 1-2-3: *A-MPR update in NS\_33 (at Fc =5860MHz) for ETSI regulation***  ***In 1st round, two companies prefer to revise A-MPR requirements for NS\_33 based on R4-2110400. And one company propose further discussion is needed to check the missing A-MPR requirements. So RAN4 still need further discussion with following candidate options in 2nd round.***  *Candidate options:*   * Option 1: Allow A-MPR updating based on HW discussion paper (R4-2110400). * Option 2: Need further check the detail missing A-MPR requirements.   *Recommendations for 2nd round:*  **Based on above 2 candidate options, RAN4 will further discuss the A-MPR relaxation for NS\_33 in 2nd round.** |

### 1.4.2 CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| **R4-2109045** | *Based on 1st round of comments collection, moderator can recommend as*  *“Revised to ”* |
| **R4-2109922** | *Mirror CR of R4-2109045. 🡪 Moderator can recommend as “Return to”* |
| **R4-2109689** | *Based on 1st round of comments collection, the CATT will treat to capture the On/Off time Masks for TDM operation in ITS spectrum. So moderator can recommend as*  *“Not pursed”* |
| **R4-2109690** | *Mirror CR of R4-2109689. 🡪 Moderator can recommend as “Withdrawn”* |
| **R4-2110020** | *Based on 1st round of comments collection, the CATT will treat to capture the On/Off time Masks for TDM operation in ITS spectrum. So moderator can recommend as*  *“Not pursed”* |
| **R4-2110021** | *Mirror CR of R4-2110020. 🡪 Moderator can recommend as “Withdrawn”* |
| **R4-2111438** | *Based on 1st round of comments collection, the CATT will treat to capture the On/Off time Masks for TDM operation in ITS spectrum. So moderator can recommend as*  *“Not pursed”* |
| **R4-2111439** | *Mirror CR of R4-2111438. 🡪 Moderator can recommend as “Withdrawn”* |
| **R4-2110427** | *Based on 1st round of comments collection, moderator can recommend as*  *“Revised to ”* |
| **R4-2110428** | *Mirror CR of R4-2110427. 🡪 Moderator can recommend as “Return to”* |

## 1.5 Discussion on 2nd round (if applicable)

### 1.5.1 Open issues (if applicable)

**Issue 1-1-3: RAN4 specification perspective, is it beneficial to specify the On/Off time mask in TS38.101-3 for TDM operation in ITS spectrum?**

In 1st round, 4 companies proposed to specify the On/Off time mask in TS38.101-3, and 2 companies proposed to consider RRM requirements for TDM operation.

Hence, two option still further discussed in 2nd round as follow

* Proposals
  + Option 1: In case the priorities of LTE SL and NR SL are the same, this is up to UE implementation for the switching position. So, it is not needed to specify RF requirements. The RRM requirements in clause 12.9.1 in TS38.133 can be considered.
  + Option 2: RAN4 specify the On/Off time mask in TS38.101-3.
* Recommended WF
  + FFS

**Issue 1-2-1: *A-MPR relaxation by emission requirements in NS\_52 for FCC regulation***

In 1st round, the MPR relaxation was discussed, two companies can accept the 15dB MPR relaxation. But 16dB MPR is not acceptable. So, As moderator, following candidate options are proposed in 2nd round.

* Proposals
  + Option 1: Allow 16.0 dB MPR from 13.5dB based on HW discussion paper (R4-2110400 in A-MPR region 1.
  + Option 2: Allow 15.0 dB MPR from 13.5dB based on 1st round discussion in A-MPR region 1.
* Recommended WF
  + FFS

**Issue 1-2-3: A-MPR update in NS\_33 (at Fc =5860MHz) for ETSI regulation**

In 1st round, two companies prefer to revise A-MPR requirements for NS\_33 based on R4-2110400. And one company propose further discussion is needed to check the missing A-MPR requirements. So RAN4 still need further discussion with following candidate options in 2nd round.

* Proposals
  + Option 1: Allow A-MPR updating based on HW discussion paper (R4-2110400).
  + Option 2: Need further check the detail missing A-MPR requirements.
* Recommended WF
  + FFS

### 1.5.2 Companies views’ collection for 2nd round (if applicable)

**Issue 1-1-3: RAN4 specification perspective, is it beneficial to specify the On/Off time mask in TS38.101-3 for TDM operation in ITS spectrum?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Option 1. No mask needs to be specified as RRM scheduling applies to inter-RAT switching.  To further clarify our initial remarks, to clear up any confusion on this point we this that is good to put in a note describing the switching position based on the RAN1 LS reply. We think the switching mask diagram is not necessary as it is the RRM scheduling that applies in this switching case |
| LGE | Support option 1. RAN4 do not need to specify the on/off time mask in TS38.101-3. |
| Huawei | Option 2. We did spend a lot of time on the issue of switching period topic. As a compromise, we agreed in previous WFs that the specific values are not specified in the TS, and there will no RF test for the switching time. However, it’s still not clear how to decide the position of switching time. With the time mask figure illustrated in the spec, we can have a complete understanding of the issue across RF and RRM specs.  We would like to know what the specific concern is for introducing time mask in TS 38.101-3. If the concern is for possible test, we can try to find a better solution to address the concern. |
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**Issue 1-2-1: *A-MPR relaxation by emission requirements in NS\_52 for FCC regulation***

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Option 2. Revise the current AMPR value as 15dB for NS\_52 region 1 and analyze the status of FCC regulation about the use of the 5.850-5.925 GHz Band until Aug. RAN4 meeting. |
| LGE | Support option 2. 15dB is feasible. FCC regulation will be clarified until Aug. meeting. |
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**Issue 1-2-3: A-MPR update in NS\_33 (at Fc =5860MHz) for ETSI regulation**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Option 1. The detail value will be treated in CR. |
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### 1.5.3 Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on A-MPR revision for both NS\_33 and NS\_52. | Huawei | In 2nd round discussion, the A-MPR revision will be concluded in the WF. |
| WF on transient position and related requirements in Rel-16 | LGE | In 2nd round discussion, the transient position and related requirements will be discussed in the WF. |
|  |  |  |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| [R4-2109044](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109044.zip) | Discussion on time mask for NR V2X and LTE V2X switching in ITS band | CATT | Noted |  |
| [R4-2109045](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109045.zip) | CR for TS 38.101-3, Time mask for NR V2X and LTE V2X switching in ITS band | CATT | Revised to R4-2107743 |  |
| [R4-2109688](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109688.zip) | Discussion on the switching period position between LTE SL and NR SL | vivo | Noted |  |
| [R4-2109689](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109689.zip) | CR for TS 38.101-3 Switching period position for NR V2X (Rel-16) | vivo | Not pursed |  |
| [R4-2109690](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109690.zip) | CR for TS 38.101-3 Switching period position for NR V2X (Rel-17) | vivo | Withdrawn |  |
| [R4-2109919](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109919.zip) | Switching position for TDM operation between LTE V2X and NR V2X in ITS spectrum | LG Electronics France | Noted |  |
| R4-2109922 | CR for TS 38.101-3, Time mask for NR V2X and LTE V2X switching in ITS band | CATT | Return to |  |
| [R4-2110020](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110020.zip) | CR for TS 38.101-3 switching period for V2X con-current operation | Xiaomi | Not pursed |  |
| R4-2110021 | CR for TS 38.101-3 switching period for V2X con-current operation | Xiaomi | Withdrawn |  |
| [R4-2110027](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110027.zip) | on switching period | Xiaomi | Noted |  |
| [R4-2110400](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110400.zip) | Discussion on Rel-16 NR V2X AMPR value for both NS\_33 and NS\_52 | Huawei, HiSilicon | Noted |  |
| [R4-2110427](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110427.zip) | CR for 38.101-1 to correct AMPR value for NR V2X NS\_52(Rel-16) | Huawei, HiSilicon | Revised to R4-2107744 |  |
| R4-2110428 | CR for 38.101-1 to correct AMPR value for NR V2X NS\_52(Rel-17) | Huawei, HiSilicon | Return to |  |
| [R4-2111437](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111437.zip) | On SL switching period | Huawei,HiSilicon | Noted |  |
| [R4-2111438](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111438.zip) | CR for TS 38.101-3: NR V2X SL switching period (Rel-16) | Huawei,HiSilicon | Not pursed |  |
| R4-2111439 | CR for TS 38.101-3: NR V2X SL switching period (Rel-17) | Huawei,HiSilicon | Withdrawn |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2107743 | CR for TS 38.101-3, Time mask for NR V2X and LTE V2X switching in ITS band | CATT | To be Agreed | CR for TS38.101-3 for Rel-16 |
| R4-2109922 | CR for TS 38.101-3, Time mask for NR V2X and LTE V2X switching in ITS band | CATT | To be Agreed | Mirror CR of 7743 |
| R4-2107744 | CR for 38.101-1 to correct AMPR value for NR V2X NS\_52(Rel-16) | Huawei, HiSilicon | To be Agreed | CR for TS38.101-1 for Rel-16 |
| R4-2110428 | CR for 38.101-1 to correct AMPR value for NR V2X NS\_52(Rel-17) | Huawei, HiSilicon | To be Agreed | Mirror CR of 7744 |
| R4-2107745 | WF on A-MPR revision for both NS\_33 and NS\_52. | Huawei | To be Approved | Update A-MPR for NS\_33 and NS\_52 |
| R4-2107746 | WF on transient position and related requirements in Rel-16 | LGE | To be Approved | On/Off time mask related issues |
| R4-2108019 | LS on time mask for NR V2X and LTE V2X switching in ITS band | Huawei | To be Approved | Send LS to RAN5 no Time mask test is needed for TDM operation in ITS spectrum |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents